3.5.3   MESOSPHERIC GRAVITY-WAVE CLIMATOLOGY AT ADELAIDE

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The MF Adelaide partial-reflection radar has been operating continuously since November 1983. This has enabled a climatology of gravity-wave activity to be constructed for the mesosphere. In accordance with recommendations of the GRATMAP Steering Committee, the data have been analysed for a 'medium-period' range of 1 to 8 hr and a longer period range between 8 and 24 hr, covering the inertio-period waves. The tidal motions have been filtered out prior to analysis.

For the data analysed so far (Nov 1983 – Dec 1984), a number of interesting features have emerged. Firstly, the wave activity at heights above 80 km shows a small semiannual variation with season with the activity being strongest in summer and winter. At heights below 80 km however, there is a similar but more marked variation with the weakest amplitudes occurring at the time of the changeovers in the prevailing circulation. If breaking gravity waves are responsible for much of the turbulence in the mesosphere, then the periods March-April and September-October might also be expected to be periods of weak turbulence. These predictions appear to be supported by direct observations of turbulence dissipation rates (HOCKING, private communication).

Another important feature of the gravity waves is that the wave field appears to be partially polarized. The meridional amplitudes are larger than the zonal amplitudes, especially in winter, and there is a small but finite $u'v'$ the sign of which changes with season. By calculating the "Stokes parameters" for the gravity-wave field, in analogy to a partially polarized electromagnetic wave field, it is found that the degree of polarization is about 15% in summer and 30% in winter. The polarized component is found to propagate in the opposite direction to the background flow in the stratosphere which suggests that the polarization arises through directional filtering of the waves as they propagate up from below.